

**CLAIMS:**

1. A reactor for the treatment of fluids with light radiation, comprising a tube or a vessel made of transparent material and surrounded by air, and having a fluid inlet, a fluid outlet, and at least one opening or window adapted for the transmission of light from an external light source into the tube.
2. The reactor of claim 1, wherein the tube or the vessel is made of quartz.
3. The reactor of claim 1, wherein the tube or the vessel is positioned inside a protective sleeve with an air gap in between.
4. The reactor of claim 1, wherein the window is provided with optical filter for avoiding light of unwanted wavelengths from entering the reactor.
5. The reactor of claim 1, further comprising light detectors in light communication with predetermined regions at an outer side of the tube or the vessel and in data communication with a controller of a disinfection system making use of the reactor.
6. The reactor of claim 1, further comprising at least one additional tube or vessel made of transparent material wherein the transparent tubes are of descending diameters and are positioned one inside another with gaps in between, about the same longitudinal axis, forming a multi core reactor.
7. The reactor of claim 6, further comprising at least one additional tube made of transparent material wherein the transparent tubes or vessels are of descending diameters and are positioned one inside another with gaps in between, about the same longitudinal axis, forming a multi core reactor.
8. The reactor of claim 1, wherein the fluid outlet is formed as a filling nozzle in a liquid filling apparatus.

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9. The reactor of claim 1, wherein the fluid outlet is formed as a water launcher in a washing apparatus.
10. Fluid disinfection device, comprising at least one reactor as defined by any of the previous claims, and at least one light radiation source aligned into the  
5 reactor.
11. Fluid disinfection device according to claim 10, further comprising light detectors in light communication with predetermined regions of a transparent wall of a tube inside the reactor, and in data communication with a controller of the disinfection device.
- 10 12. In a domestic water supply system, the fluid disinfection device according to claim 10, further comprising a faucet adapted to be activated by a domestic user, in liquid communication with a fluid outlet of the reactor.
13. In an air conditioning or circulating system, the fluid disinfection device according to claim 10, with its fluid inlet or outlet in air communication with at  
15 least one air blower or air pump.
14. Fluid disinfection device according to claim 10, wherein the at least one light radiation source is selected from microwave excited electrodeless UV plasma lamp, UV laser, mercury lamp.
15. Method for irradiating fluids, the method comprising accommodating  
20 fluid in a reactor, the walls of which are made of a transparent material, and the surrounding outside the wall is of a refractive index lower than that of the wall, and irradiating the accommodated fluid with light radiation aligned into the fluid in such an angle, such that light is transmitted through the fluid, and such that a major portion of light which leaves the fluid through its boundaries with the  
25 transparent wall is reflected back into the fluid or remains to shine along the transparent wall.

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16. Method for irradiating fluids according to claim 15, wherein the fluid is in continuous flow during the irradiating process.
17. Method for irradiating fluids according to claim 15, wherein the transparent material is quartz.
- 5 18. Method for irradiating fluids according to claim 15, wherein the accommodated fluid is water or other liquid transparent to certain wave lengths of the light radiation.
19. Method for irradiating fluids according to claim 15, wherein the accommodated fluid is water or other liquid transparent to certain wave lengths  
10 of the light radiation, the method is further comprising launching the water from the outlet to form a free flow water jet with light radiation locked in total internal reflection within the jet.
20. Method for irradiating fluids according to claim 19, further comprising washing a surface or a container with the free flow jet.
- 15 21. Method for irradiating fluids according to claim 19, further comprising filling a bottle or a container with the free flow jet.
22. Method for irradiating fluids according to claim 19, further comprising filling a container with the free flow jet, and simultaneously evacuating the air rejected from the container by the liquid being filled, and suctioning it into a  
20 second reactor according to the present invention, or into a second flow channel in the same reactor in which the liquid is irradiated, for irradiating the air.
23. Method for irradiating fluids according to claim 19, further comprising dissolving into the liquid oxidizing agents, air, or gas, in order to enhance the disinfection process.
- 25 24. Method for irradiating fluids according to claim 21, further comprising a promotion step of dry disinfection of the containers to be filled by means of

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quartz rod inserted into the container opening and irradiating it with UV emitted from the rod.

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